Medical School Hotline

The Role of Epidemiology in Medical Education

Beatriz L. Rodriguez MD, PhD, J. David Curb MD, MPH, Helen Petrovitch MD, Kamal H. Masaki MD

The multiple disciplines that contribute to the knowledge about health and disease can be categorized into three areas: clinical medicine, bench science, and population-based medicine. Population medicine, in contrast to clinical medicine, is focused on the community as opposed to individuals. Epidemiology is the discipline that provides population medicine with a systematic approach to study the patterns of occurrence of disease and delivery of medical care.[1] Originally epidemiology was concerned with providing the methodology for the study of population epidemics. Today it has a broader scope—the study of health and disease in human populations. Some of these topics include chronic and acute illnesses, health care utilization,[2] and molecular epidemiology. Information derived from epidemiologic studies is utilized to design programs for prevention and control of disease.[1,3]

Although the importance of epidemiology and its role in preventive medicine is increasingly being recognized by the medical community and the public, its role in medical education needs to be emphasized. Medical students and residents often lack the motivation to study epidemiology because they think of it as a peripheral discipline in medicine that may not be directly relevant to clinical practice.[4]

However, clinical medicine, bench science and population medicine are highly interrelated. Physicians often use information derived from epidemiologic studies in practice. The age, sex, occupation, behavioral characteristics of a patient, and the knowledge about the prevalence of a disease in the community must be considered when making a diagnosis. In the same manner, the accuracy of individual diagnoses made by clinicians and the completeness with which reportable diseases are made known to health authorities are essential in the assessment of occurrence of disease in a community.[1] Nobody would expect to understand a disease without the knowledge of its clinical findings and pathology. However, many physicians have little knowledge about another important aspect, the study of disease in relation to populations.[5]

Cardiovascular diseases provide an example of the importance of epidemiology and prevention. Since 1960, there has been a decline of nearly 50% on the rates of cardiovascular disease mortality in the United States. Most data suggest that primary prevention played a significant role in this decline. During these years, the prevalence of cigarette smoking and blood cholesterol levels have decreased and blood pressure is also better controlled.[6] These trends are greatly influenced by the interaction of the medical practitioner with each of his or her patients. In many cases, the impact of these life-style changes promoted by physicians may have only a moderate impact on the health of a particular individual; however, when these changes occur in many individuals, they can have a major impact on health at the population level. Thus, it is essential that medical students understand the importance of their role in the promotion of health in their communities.

After completing formal medical training, most physicians depend on conferences and medical journals to learn about advances in medicine and for making treatment decisions in individual cases. Evidence-based medicine, decision analysis, and clinical decision making are rooted in the use of epidemiologic methods and principles. Epidemiologic methods have specific techniques for data collection, analyses and interpretation of results, and jargon of technical terms. Therefore, it is crucial that physicians have a basic understanding of the principles of epidemiology prior to completing their training. Physicians must be able to evaluate critically the medical literature in order to judge the strengths and limitations of data on which they will base clinical decisions. In general, medical students and residents are interested in the content of epidemiologic studies and their application to clinical settings. However, an understanding of the methods used to conduct the studies is necessary to determine if the conclusions of the study are valid.

Critical review of journal articles can be used to motivate physicians in training to learn epidemiology.[4] Often, fellows and academic physicians who have not had training in research methods develop clinical studies without seeking appropriate advice. Thus, these projects encounter problems with funding and the publication of manuscripts. These studies are often based on good ideas, and would yield valuable results if appropriate methods were used.[5]

Two years ago, the John A. Burns School of Medicine at the University of Hawaii at Manoa formed the Division of Clinical Epidemiology within the Department of Medicine. This division, which works closely with the Division of Geriatric Medicine, conducts large epidemiologic research studies funded by the National Institutes of Health including: the Honolulu Heart Program, the Honolulu-Asia Aging Study, the Women's Health Initiative (Women's Health Hawaii), Genetic Determinants of High Blood Pressure (SAPPHIRe), and a study on Macronutrients and Blood Pressure (INTERMAP Hawaii) among others. Geriatric Medicine and General Medicine fellows at the University of Hawaii Department of Medicine attend a weekly course on research methods conducted by the Divisions of Clinical Epidemiology and Geriatric Medicine. Many of these fellows have had the opportunity of being directly involved in some of these important investigations and are learning research methods from this experience. It may be considered beneficial to expand this program to include all medical students and residents in schools of medicine.

Divisions of Clinical Epidemiology
and Geriatric Medicine
John A. Burns School of Medicine
University of Hawaii, Manoa

References:

1. Mausner JS, Kramer S. *Epidemiology, an introductory text.* WB Saunders Co; 1985, 1-21.
2. Kleinbaum DG, Kupper LL, Morgenstern H. *Epidemiologic Research, Principles and Quantitative Methods.* Van Nostrand Reinhold Company; 1982, 2-15.
3. Lilienfeld AM, Lilienfeld DE. Foundations of Epidemiology. Oxford University Press; 1980, 3-20.
4. Grufferman S, Kimm SY, Maile MC. Teaching epidemiology in medical schools: A workable model. *Am J Epidemiol.*1984;120:203-209.
5. Rose G, Barker DJP. Epidemiology for the uninitiated. *British Med J.* London, 1986.
6. Pearsson TA, Criqui MH, Luepker RV, Oberman A, Winston M,eds. *Primer in Preventive Cardiology, American Heart Association.* Dallas, Texas: 1994.